

WHAT IS CLAIMED IS:

1. An electro-optical level comprising:

a bubble level having a liquid and a gas bubble therein;

a light source in proximity to the bubble level for directing light toward and through the bubble level;

a light sensor disposed on a side of the bubble level opposite the light source and operative for identifying characteristics of light impinging thereon; and

a lens disposed between the bubble level and the light sensor for focusing an image of the bubble onto the light sensor.
2. The electro-optical level of claim 1, wherein the liquid and the bubble are disposed in a bubble tube, the light sensor comprises a CCD linear array aligned substantially parallel to the bubble tube and having a length exceeding a length of the bubble in the bubble tube.
3. The electro-optical level of claim 1, wherein the lens is an elongate lens aligned substantially parallel to the bubble level and wherein the light sensor is an elongate sensor aligned substantially parallel to the lens.
4. The electro-optical level of claim 3, wherein the lens is a cylindrical lens.
5. The electro-optical sensor of claim 3, wherein the lens is an elongate lens array comprising a plurality of lenses, the lens array being aligned substantially parallel to the bubble level.
6. The electro-optical level of claim 1, wherein the light source is a substantially linear light source aligned substantially parallel to the bubble level.

7. The electro-optical level of claim 6, wherein the light source is a cold cathode illuminator.

8. The electro-optical level of claim 1, further comprising a display for displaying output readings of said light sensor indicative of levelness.

9. The electro-optical level of claim 8, further comprising a housing for enclosing and supporting the bubble level, the light source, the lens and the light sensor, the display being pivotally mounted to the housing for altering viewing angles of the display relative to the housing.

10. The electro-optical level of claim 9, further comprising a handle incorporated into the display for transporting the electro-optical level.

11. The electro-optical level of claim 9, wherein the housing has a base surface aligned substantially parallel to the bubble level for supporting the housing on an object to be tested for levelness.

12. The electro-optical level of claim 8, further comprising a controller connected to the light sensor and the display, the controller being operative to identify display output data indicative of at least one end of the bubble.

13. The electro-optical level of claim 12, wherein the light sensor is operative to produce a plurality of output voltages at a corresponding plurality of locations along said light sensor, said controller being operative to identify output voltages indicative of at least one end of the bubble.

14. A method for assessing levelness of an object comprising:

- providing a bubble level having a bubble tube with a liquid therein and a bubble formed by the liquid in the bubble tube;
- placing said bubble tube in a position substantially parallel to a surface of the object;
- directing light through the bubble tube;
- focusing at least a portion of the light passed through the bubble tube;
- sensing characteristics of the focused light at a plurality of locations along the bubble tube;
- identifying characteristics sensed for the focused light for identifying at least one end of the bubble; and
- calculating a degree of levelness based on a location sensed for the end of the bubble.

15. The method of claim 14, wherein the step of identifying at least one end of the bubble comprises identifying positions for opposed ends of the bubble relative to a longitudinal axis of the bubble tube.

16. The method of claim 14, further comprising performing a calibrating step to determine a length of the bubble relative to a longitudinal axis of the bubble tube, and wherein the step of calculating a degree of levelness comprises comparing a location of a single end of the bubble with information calibrated for the length of the bubble.

17. The method of claim 14, wherein the step of identifying characteristics of the focused light comprises measuring output voltages produced by the focused light at each of a plurality of locations parallel to the bubble tube, and identifying at least one location having a significantly lower output voltage level than locations spaced therefrom.

18. The method of claim 17, further comprising the step of establishing a threshold voltage less than a maximum output voltage produced by the focused light and greater than the lower output voltage and identifying at least one location where said measured output voltage substantially equals said threshold voltage for determining location data corresponding to at least one end of the bubble.